PROPOSAL UNDER NMET FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR LIMESTONE IN AND AROUND NANHWARA KYMORE AREA IN KATNI DISTRICT OF MADHYA PRADESH (PROPOSED AREA 22.52 KM^2)

COMMODITY: LIMESTONE

BY

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PLACE: JABALPUR **DATE: 9th NOVEMBER 2024**

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Annexure No. 1	DRM of Katni district of Madhya Pradesh.
Annexure No. 2	Report on Geology of Vindhyan Supergroup Kymore- Bhadanpur area in Jabalpur, Panna, Satna and Shadol, districts, Madhya Pradesh (Toposheet Nos. 64A/09, 63D/12, 63D/16) (Field Season 1985-1986) by S. Sanyal, Geologist, KC. Bandyopadhyay, Geologist, Dr. K. Sanyal, Geologist and S. Prasher, Asst. Geologist.

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PLATE NO.	NAME OF PLATE	SCALE
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Plate No. 4	Proposed Block on Regional Geological Map.	1:50,000
Plate No. 5	Proposed Block showing Geology of the area, boundary co-ordinates, sample locations, proposed boreholes and key features.	1;4,000

❖ Other

FILE NO.	NAME OF FILE
KML-01	KML file of the proposed area.
IMG-01	Images of sample locations and nearby working mines.

SUMMARY OF THE BLOCK FOR RECOINAISSANCE SURVEY (G4 STAGE)

S. NO.	FEATURES	DETAILS
	GENERAL INTRODUCTION	
	Block ID	Nanhwara-Kymore Limestone Block
	Current Exploration Agency	Engeotech Consultant
	Previous Exploration Agency	None
	Commodity	Limestone
	Mineral Belt	Jhukehi-Kymore-Bhadanpur Limestone belt. The mineral belt consists of Rohtas Formation of Semri Group, belonging to Vindhyan Super Group having Meso-Proterozoic age.
	Completion period with entire time Schedule to complete the project.	The work will be completed within 12 months after approval of project.
	Objectives	The present proposed exploration block is located in the vicinity of Rohtas Limestone Formation of Semri Group of Vindhyan Supergroup having Meso-Proterozoic Age. This limestone belt is known as Jhukehi-Kymore-Bhadanpur Limestone belt. On the North Western boundary of present exploration block there is captive mines of M/s ACC Ltd. named as Mehgoan Limestone Mines and Kymore & Bamangoan Limestone Mines are located. Detailed lithology of these mines has been taken into consideration while deciding this exploration block. Presence of supporting lithology for Limestone i.e., Rohtas Limestone Formation and detailed Geological Mapping of the area by Sanyal & Sanyal, Bandhyopadhyay and Parashar have indicated presence of Limestone band in the area. Further active mining activity is already is continued in North-Western boundary of proposed exploration block has compelled us to make exploration under G4 Stage of Minerals (Evidence of Minerals Contents) Rules 2015. On the basis of these evidences of mineralization, the present exploration program has been formulated to fulfill the following objective- 1. To carry out Topographical survey and Geological mapping on 1:12,500 Scale for demarcation of Limestone band for this mineralization with the structural features to identify the surface manifestations and lateral disposition of the mineralized zones. 2. Demarcation of various types of Limestone bands in the area for estimation of its extents and Quality.

		3. To collect the details of Mining History and information of old workings. 4. To collect Geochemical samples (bedrock, old pits, trenches, cuttings etc.) and analyze them for Limestone to pave way for further course of exploration program. 5. To know the depth wise and lateral continuity of the mineralization about 07 Nos. of scout bore holes shall be drilled as per norms of G4 Stage of exploration under Minerals (Evidence of Mineral Contents) Rules 2015. 6. Attempt to delineate a block or more than one block to upgrade investigations in G3 Stage.
	Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and name of the outsource agency	Entire Work will be carried out by - M/s Engeotech Consultant, Address: 1338, Kachnar City Road, Vijaynagar, Jabalpur-482002 (M.P.) Contact: 9425387402, 0761-3581305 Email ID: engeotech@rediffmail.com Engeotech Consultant has following credentials & capabilities- • Notified Private Exploration Agency & and NABET Accredited A-Category Exploration Agency • ISO Certified & Empaneled by M.P. State Govt. for DGPS Survey • Owns Two Hydraulic Drill Rigs and Latest TST, GPS, DGPS and Drones. • State of the art Ore Microscope • Ample quantity of Laptops, Desktops and latest software. • Team of competent and skilled field geologists, surveyors, drone pilots, AutoCAD professionals, drillers, samplers along with other proficient Technical Staff with skills and knowledge of data processing. • MOU with sister concern BSS Lab Private Limited, an NABL accredited lab having latest equipment like AAS, Particulate Matter Analyzer, BOD Incubators etc. with an expert team of chemists. Hence Engeotech Consultant is capable of executing entire exploration work independently and no out sourcing will be required.

	Name/ Number of Geoscientists	**In field**: Two Geologists. **At Headquarters**: Two Geologists. Geologists in field and headquarter will work under supervision of senior Geologists of Engeotech Consultant.
	Expected Field days (Geology) Geological Party Days	**In field**: Two Geologists for 45 days each. **At Headquarters**: Two Geologists for 15 days each **Geologist Party days:** 90 days at field and 30 days at HQ.

1.	**Location**	
	Latitude	23°59’12” to 24°02’52”
	Longitude	80°32’13.54” to 80°37’37.4214”
	Villages	Nanhwarakala, Mehgoan, Badari, Kymore, Bamangoan, Deori Majhgawan, Gudgodohan etc.
	Tehsil/ Taluk	Vijayraghavgarh
	District	Katni
	State	Madhya Pradesh
2.	**Area (hectares/ square kilometers)**	
	Block Area	**22.52 km^2 or 2252 Ha (approx.)**
	Forest Area	Details not known.
	Government Land Area	Details not known.
	Private Land Area	Details not known.
3.	**Accessibility**	
	Nearest Rail Head	Jhukehi on Maihar-Katni Section of West Central Railway, Madhya Pradesh. There is a branch line from Jhukehi to Kymore for transportation of Limestone and Lime. There are several railway sidings on this line in which rake loading facility is available.
	Road	NH-44 (Previous NH-7) about 15km towards Western side of the proposed limestone block.
	Airport	Khajuraho Airport -160 kms(approx.)
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Dendritic.
	Rivers/Streams	The area is drained by Chhoti Mahanadi, Koilari Nadi, Umrer Nadi, Halphal Nadi and Katni Nadi are its tributaries. Beside above Jhapawn Nala and Jarjarar Nala are also present in the area. Chhoti Mahanadi, Katni Nadi and Umrer Nadi are perennial rivers. Whereas, others are non-perennial.
5.	**Climate**	
	Mean Annual Rainfall	1200 mm approx.
	Temperatures (June)(Maximum) (December)(Minimum)	The temperature in December and January sometimes drops up to 4°C during night, while summer is severely hot with temperatures ranging between 38°C to 46°C in the months of May and June.
6.	**Topography**	
	Topo Sheet Number	63D/12 and 64A/9.
	Morphology of the Area	Almost flat Country with highest RL of 380 mRL and lowest RL of 365 mRL.

7.	**Availability of baseline geosciences data**	
	Geological Map (1:50K/ 25K)	1:2,50,000 Scale map is available (DRM) and 1:50,000 (by Sanyal and others)
	Geochemical Map	-
	Geophysical Map (Aeromagnetic, groundgeophysical, Regional as well as local scale GP maps)	-
8.	**Justification for taking up Reconnaissance Survey/ Regional Exploration**	Katni district of Madhya Pradesh was previously coming under the Jabalpur district. In Katni and Kymore area occurrences and mining of Limestone are known since 1860. A limestone band starting from Katni, via, Jukehi, Kymore, Sadera, Piprahat, Bhadanpur, and Majhgawan in M.P. This belt is continued in Katni, Satna and Sidhi districts of M.P. and is continued in Sonebhadra district of U.P. and it extends up to Rohtas district of Bihar. More than 200 Nos. of Captive as well Non-Captive Mining leases are being operated in this Limestone belt. Limestone of this Limestone belt is supplied to all important limestone consuming industries in the India. Along with Cement Plants, the Limestone of the area is consumed in Aluminum, Paper, Sugar and Carbide Industries. This region is biggest producer of Lime in the Country. In this belt active Limestone mining activity is continued and it is necessary to establish additional Resources of Limestone. Previously, detailed mapping of the area was done by S. Sanyal, Smt. K. Sanyal, Parashar and Bandyopadhyay of the GSI during the Field season 1985-86. In view of above it is necessary to carry out exploration under Minerals (Evidence of Mineral Contents) Rules 2015 under G4 Stage. In view of MMDR Amendment & Mineral Auction Rule 2015, we have selected this block for exploration of Limestone to take up under NMET funding. Limestone of the area is sedimentary type and comes under Category-I of Minerals (Evidence of Mineral Contents) Rules 2015. In the proposed Exploration Block area, Geological continuity of Limestone in Strike and Dip Direction is established.

DETAILED DESCRIPTION ON THE FOLLOWING TITLES TO BE MADE IN THE PROPOSAL.

1.0 Block Summary-

- **Physiography-**

  The area has almost flat topography with elevations ranging between 365mRL to 380mRL above mean sea level. The drainage pattern of the area is dendritic. The area is drained by river Chhoti Mahanadi, Umror, Katni Nadi, Koilari Nadi etc.

- **Regional Geology –**

  The Vindhyan Formations of Central India form an ENE-WSW trending syncline. The northern limb of the syncline shows Bundelkhand granite overlained by Vindhyan Formations dipping imperceptibly towards SSE. The southern limb shows sub vertical NNWly dipping formations in faulted contact with Mahakoshal/Sidhi Group of rocks. Semri Group is well developed and well exposed in the eastern half of the area mapped, and continues into adjoining areas eastward which exposes several well-developed sections along Son valley region. In the adjoining westward areas, around Katni, Semri Group is almost entirely concealed under post-Vindhyan cover; Further west, Semri and Kaimur Groups are indistinguishable and together they constitute a linear ridge of steep newly dipping beds along Bahuriband-Biriya tract. Thickness of Kaimur Group, too, decreases from east to west. Upper half of Kaimur group shows a monolithic, cross-bedded orthoquartzite which forms a prominent south facing escarpment on Kaimur Hill; the thickness of this orthoquartzite and its scarp forming nature diminishes westward along strike; eventually the orthoquartzite disappears under scree cover in the adjoining westward area. The lower half of Kaimur Group shows a shale-porcellanitic-clay assemblage, which in some places begins with an orthoquartzite in sharp contact with the underlying Rohtas Limestone Formation. The shale-porcellanitic is well exposed around Kaimur and becomes increasingly scarce along strike on either side. West of Kaimur, around Kanchhagawan region shale- Porcellanite is thinner and banded clay appears in the sequence. East of Kaimur, although exposures are rare because of scree cover, the shale-porcellanite can be seen persisting along strike, continuing into the Son Valley area towards east. It needs mentioning in the context that the shale-porcellanite assemblage is designated as Bhagwar Shale Formation, overlying Rohtasgarh Limestone Formation; and the two Formations, together, constitute Rohtas Subgroup at the top of Semri Group (Shastry & Moitra op.cit). Semri Group comprises shale-limestone-sandstone formations in which medium to coarse sand facies are largely restricted to the basal parts, (i.e., in Deoland Formation of Mirzapur Subgroup). The overlying parts i.e., Kheinjua Subgroup and Rohtas Subgroup are dominated by argillite-limestone facies. Deonar Formation (Porcellanite Stage) defines a well- known stratigraphic marker, but in terms of thickness the porcellanite beds represent a narrow period of time during Semri deposition.

  The most conspicuous feature of Semri Group that distinguishes it from the overlying Kaimur, Rewa and Bhander Groups, is recurrent appearance of limestone bands throughout the sequence, culminating in the thick and virtually monolithic Rohtas Limestone towards the end of Semri deposition. The advent of Kaimur sedimentation marks a sharp change in depositional environment which led to the alternating sequence of thick, cross-bedded sandstone and shale formations of Kaimur, Rewa and Bhander Groups. Limestone bands reappear, after a long time- interval, in the lower parts of Bhandar Group. In the northern limb of Vindhyan syncline, limestone bands appear in the lower parts of Rewa Group as well. But in spite of the calcareous occurrences, Rewa and Bhander Groups, in both limbs, are dominated by shale-sandstone facies. It bears emphasizing that the aforesaid

discussion refers to the Semri succession of the southern limb, known from Son Valley region. The development of Semri Group in the northern limb cannot be immediately correlated with the Son Valley succession. Thus, in the southern limb, the contact between Rohtas Limestone and the overlying sandstone-Shale-Porcellanite marks turning point from predominance of shale-limestone facies, to the dominance of shale-sandstone facies. In view of the major and lasting environmental change indicated by the contact, Rohtas Limestone was considered the top of Semri Group in the present work. The stratigraphic column of the area mapped was derived from the order of superposition and the nomenclature was obtained from correlation with known successions in adjoining areas (after Shastry & Moitra, 1984). The stratigraphic succession of the area mapped in given below:

TABLE-I

Post Vindhyan Formations			(Equivalence after Auden 1933 quoted in Shastry & Moitra op
----------Erosional unconformity----------			
Bhander group	Upper Bhander Sandstone Formation		
	Sirbu Shale Formation		
	Nagod Limestone Formation		
	Ganurgarh Shale Formation		
Rewa Group	Upper Rewa Sandstone Formation		
	Jhiri Shale Formation		
Kaimur Group	Kaimur Sandstone Formation		
	Bhagwar Shale Formation		
Semri Group	Rohtas Limestone Formation		
	Kheinjua Group	Rampur Formation	Glauconite beds
		Salkhan Formation	Fawn Limestone
		Koldaha Shale Formation	Olive Shale
	Deonar Formation		Porcellanite Stage
----------Base not seen ----------			

Rohtas Limestone Formation

Rohtas limestone formation is virtually monolithic and comprises grey-bluish grey, well bedded limestone bands. Light colored clayey limestone interbeds are present, generally near the upper contact. Shaly interbeds are rare and have been noticed near Hinauta Khurd. The limestone bands of Kheinjua subgroup are generally lighter colored and invariably contain shaly interbeds and chert lenses). Near the lower contact, the formation shows a fine-grained sandstone interbed (about 1m) in a nala section, about 1.5 km towards NNW of Khara. The sandstone could be traced, discontinuously, over a distance of about 2 km along strike. Thin sandy interbeds near the lower contact defines a gradational zone, representing the narrow transitional period during which deposition of argillite- carbonate facies changed to the precipitation of carbonate facies. Rohtas limestone beds show extensive development of open to close folds, overlain and underlain by gently dipping (towards NNW) homoclinal beds. Intraclasts are common within the formation.

Stromatolitic structures have been noticed at some places. In some places hemispherical depressions are present on limestone beds. In other places hemispherical lenses project above the bedding plane. Both types appear to have resulted from erosion of concretionary growth structures within limestone beds. The contact with overlying Kaimur Group is conformable and sharply defined by the appearance of no calcareous orthoquartzite, as can be seen in some quarries near Kaimur and east of Bhadanpur.

The thickness of Rohtas limestone could not be estimated because of extensive warping. The width of the formation between Badera and Bhadanpur suggests a thickness of the order of 500m. Decrease in the width and, therefore, the thickness of Rohtas Limestone east of Sarang-Junwani line corroborates the basinal 'high' discussed in the description of Salkhan Formation.

- **Local Geology of Block-**

Proposed Limestone Exploration block comes under the Jhukehi -Kymore Bhadanpur Limestone belt of Rohtas Formation of Semri Group. Adjacent to proposed Limestone Exploration block in Northern side the area is under active mining operation since last 100 years and Local Geological point of view, the lease area has Lower Vindhyan (Semri) Limestone occurring with alternate bands of shale or shaly limestone.Local Geological sequence of the area is given below-

- Lateritic Soil: 5-6m
- Alternate bands of Limestone and Shale bands: 50m-73m
- Base not reached

Strike and Dip-General strike of the area is N60°E-S60°W, having dip 4-15 degree towards the North but it varies from NE-SW to N70^{o}E-S75^{o}W.

- **Mineral potentiality based on Geology, Geophysics, Ground Geochemistry etc. Scope for proposed exploration.**

  Proposed exploration block under G4 Stage Minerals (Evidence of Mineral Contents) Rules 2015 is a part of famous Jhukehi-Kymore-Bhadanpur Limestone belt of Rohtas Formation of Semri Group. In this belt occurrence of limestone is known since 1850 and Limestone produced from the area is supplied to all important limestone consuming industries of different part of India. There are about 100 Nos. of Limestone mining leases are operating in present Limestone belt. Further, Limestone of this belt is Captive source of 5 Nos. of Cement Plants in Katni, Satna and Sidhi districts. Limestone mining is reported up to a depth of 50m. in this belt. In many mines mining of Limestone is reached for more than 50m depth. Hence potentiality Limestone in the area is extremely good.

- **Scope for proposed exploration:**

  In and around the area limestone is reported and in operations since 1860. Till 1917 it was worked by Katni Cement Work. In 1923, many Cement companies merged into single company named as Associated Cement Companies Ltd. Kymore Cement Plant was the first Cement Plant of Associated Companies Ltd. Near the Northwestern boundary of presents exploration block about 100 Nos. of mining leases of limestone exists. In the proposed block continuity of Limestone belonging to Rohtas Formation of Semri Group of Vindhyan Super Group have been noticed. Scope of proposed exploration work are to –

  1. To carry out Topographical survey and Geological mapping on 1:12,500 Scale for demarcation of Limestone band for this mineralization with the structural features to identify the surface manifestations and lateral disposition of the mineralized zones.
  2. Demarcation of various types of Limestone bands in the area for estimation of its extents and Quality.
  3. To collect the details of Mining History and information of old workings.
  4. To collect Geochemical samples (bedrock, old pits, trenches, cuttings etc.) and analyze them for Limestone to pave way for further course of exploration program.
  5. To know the depth wise and lateral continuity of the mineralization about 07 Nos. of scout bore holes shall be drilled as per norms of G4 Stage of exploration under Minerals (Evidence of Mineral Contents) Rules 2015.
  6. Attempt to delineate a block or more than one block to upgrade investigations in G3 Stage.

PROPOSED BORE HOLE NO.	GEOGRAPHICAL CO-ORDINATES	
	LATITUDE	LONGITUDE
1	24° 00' 44.6785" N	80° 33' 19.5274" E
2	24° 00' 14.0769" N	80° 34' 05.7430" E
3	23° 00' 53.5221" N	80° 34' 42.2104" E

- **Previous Work-**

  (Previous Exploration in adjoining area (Regional area); All the sample (bed rock/trench/groove/soil), borehole location should be plotted on the geological map and analytical datashould be discussed briefly I Previous Exploration in the proposed block area: The entire sample (bed rock/trench/ groove/soil), borehole location should be plotted on the geological map and analytical datashould be discussed briefly):

  Previous exploration in the adjoining area-M/s ACC has done huge exploration in almost entire limestone belt. But its details are not made available. Similarly, M/s DCM, M/s Hindustan Steel ltd M/s Rungta Mines Ltd. has also done detailed exploration. Recently M/s ACC has completed exploration in Punchhi Block.

  In the proposed exploration block, exposures of limestone were noticed in old pits and nala cuttings, well cuttings, outcrops etc., otherwise entire area is mostly soil covered. All the samples of bed rock, trench, groove, outcrops, from old dumps etc. will be collected and chemical analysis of these samples will be done and its location will be plotted on Surface Geological map and analytical date of these samples will be discussed during resource estimation.

- **Observation and Recommendations of previous work.**

  In the area Limestone is reported and mining of limestone is continued since 1860. Huge exploration is carried by many exploration agencies Like M/s A.C.C., H/s Hindustan Steel ltd., M/s DCM, M/s Rungta Mines Ltd. etc. But its further details are not available. The area is highly mineralized up to 1km distance from the Kymore Hill in North side of the belt. There are large nos. of limestone mines are situated on this side. The GSI has mapped entire belt in 1985-86 and occurrence of limestone has been indicated in this belt but very little work has been done in Southern side of proposed block. In view of above entire southern side of present belt where present exploration block is situated is to be explored under G4 Stage of MEMC Rules 2015.Based on Geological Mapping by GSI during 1985-86 this part needs to be explored under G4 Stage. Accordingly, present exploration has been made under G4 stage under NMET funding. Objective of present exploration proposals are to know continuity of Limestone in the proposed limestone block along with quality and quantity of Limestone available in the area. In view of above detailed mapping of the area, collection of samples from out crops, pit, cuttings etc. have been proposed. After that necessary chemical analysis of samples will be done to assess quality and quantity of the Limestone.

Details of Limestone Samples collected in Nanhwara-Kymore Limestone Block under G4 Stage of Exploration							
S.N.	**Sample No.**	**Location**		**SiO_2**	**CaO**	**MgO**	**Remarks**
1.	NNH-KY/NANHWARA/LST/S1	23° 59' 50.2980" N	80° 32' 08.4180" E	39.81	22.56	03.40	Bore Well
2.	NNH-KY/KALEHRA/LST/S2	24° 01' 26.5800" N	80° 34' 54.6240" E	06.60	46.64	01.22	Surface Exposures in Kalehra village
3.	NNH-KY/KALEHRA/LST/S3	24° 01' 41.8380" N	80° 34' 57.0240" E	04.64	49.52	02.18	From abandoned Limestone Quarry
4.	NNH- KY/KALEHRA/LST/S4	24° 01' 49.1460" N	80° 34' 54.8460" E	04.40	48.72	01.98	Sorted from canal cutting dump
5.	NNH- KY/DEORIMAJH/LST/S5	24° 01' 49.4520" N	80° 34' 56.4720" E	10.74	48.57	0.91	----Do---
6.	NNH- KY/NANHWARA/LST/S6	24° 01' 49.4820" N	80° 34' 56.6260" E	03.55	46.42	3.12	----Do---
7.	NNH- KY/AMHETA/LST/S7	24° 00' 45.8580" N	80° 35' 16.5240" E	07.29	50.94	1.70	Old pit near Southern boundary of Block
8.	NNH- KY/MEHGOAN/LST/S8	23° 59' 45.3000" N	80° 33' 18.6060" E	06.84	47.52	1.82	Canal site south of Mehgoan Limestone mines

3. Block description

The area under proposal is consists of one block having an area of 22.52 km^2 or 2252 Ha. The Geographical Co-ordinates of the area are given below-

NAME	UTM Co-ordinates		Geographical Co-ordinates	
	X	Y	LATITUDE	LONGITUDE
A	452918.5	2654684	24° 00' 12.3580" N	80° 32' 13.5461" E
B	453423	2652841	23° 59' 12.4812" N	80° 32' 31.6152" E
C	456121	2654123	23° 59' 54.4648" N	80° 34' 06.9596" E
D	459033	2655508	24° 00' 39.7591" N	80° 35' 49.8837" E
E	462074.9	2656929	24° 01' 26.2279" N	80° 37' 37.4214" E
F	461210.2	2658006	24° 02' 01.1726" N	80° 37' 06.7083" E
G	460437.2	2658968	24° 02' 32.4098" N	80° 36' 39.2484" E
H	459869.4	2658948	24° 02' 31.6776" N	80° 36' 19.1480" E
I	458707.5	2659582	24° 02' 52.2017" N	80° 35' 37.9456" E
J	458227.2	2658357	24° 02' 12.3262" N	80° 35' 21.0676" E
K	457811.1	2657935	24° 01' 58.5714" N	80° 35' 06.3789" E
L	457514.2	2657955	24° 01' 59.1714" N	80° 34' 55.8668" E
M	457511.8	2657514	24° 01' 44.8465" N	80° 34' 55.8269" E
N	457300.6	2657525	24° 01' 45.1762" N	80° 34' 48.3473" E
O	457327.7	2657057	24° 01' 29.9627" N	80° 34' 49.3582" E
P	456696.9	2656990	24° 01' 27.7335" N	80° 34' 27.0329" E
Q	454371.1	2655697	24° 00' 45.4643" N	80° 33' 04.8486" E
R	454046.1	2655190	24° 00' 28.9251" N	80° 32' 53.4007" E
S	453597.7	2654927	24° 00' 20.3291" N	80° 32' 37.5599" E

4. Planned Methodology:

Entire work will be done under G4 Stage as per Guidelines given in the UNFC-1997 and Mineral (Evidence of Mineral Contents) Rules – 2015.Work will start with Geological mapping of the block on 1:12,500 Scale. The block boundaries will be marked on the surface. After that Topographical Survey of the area will be done. Survey work will be done by TST and DGPS-Drone Combination Simultaneously, Lithological and Structural Geological details will also be marked. Then bore hole locations will be given on the proper grid as per norms of Mineral (Evidence of Mineral Contents) Rules - 2015. Accordingly, bore hole drilling will be carried out by putting 07 Nos. of scout bore holes. Depth of the bore holes will be 30m depth. Samples of bore hole core will be collected at one meter interval and sent for chemical analysis. Chemical analysis of CaO, MgO, SiO2, Al2O3, Fe2O3, LOI etc. will be analyzed. All-important radicles will be chemically analyzed. Bulk Density and Sp. Gravity (05Nos.) tests will be carried out. Microscopic study of each Litho units occurring in the area will be done for 05 samples. Based on above details plans and Section will be prepared. These activities will be followed by data interpretation and report writing work.

5. Nature Quantum and Target

Components	G3 Stage
Geological Survey	i) 1: 12,500 Scale for 22.52 km^2 or 2252 Ha (approx.) areas. ii) A team of field Geologists & surveyors will be deputed by the M/s Engeotech Consultant. Entire work will be done under the guidance of senior geologists of Engeotech Consultant. Geologists will visit the entire area and do preliminary survey to know lateral and vertical continuity of the mineralization, control of mineralization, occurrence of other minerals etc. All surface exposures, old pits, openings etc. will be marked along with Geological mapping of the area at prescribed scale. Sufficient number of traverses will be taken for Geological Mapping and the collected data will be plotted to delineate the mineralization which will help to explore mineralization in a planned way.
Geochemical Survey	Regional Grab/Chip/ Soil sampling etc. Approximately 60 Nos. of such samples will be collected form chemical analysis.
Geophysical Survey	Occurrence of Limestone in the area is well known and extensive limestone mining is continued in Northern part of the belt. Hence any Geophysical Survey is not proposed.
Pitting/Trenching	Trenching of 135 m^3 and pitting of 18 m^3 has been proposed.
Scout drilling/ Systematic drilling	To delineate of Limestone bands in the area 03 Nos. of core bore holes will be drilled.
Core sample	Core sampling will be done at 1m interval for every bore hole. After that Chemical analysis for all important radicals will be carried. Counter sample will be preserved for further record. About 03 Nos. of bore holes will be drilled up to depth of 30m, 30m and 50m. Hence 30+30+50=110 Nos of core samples will be collected for chemical analysis.
Petrographic and minerographic studies	Approx. 05 Nos. Principal rock types, mineral assemblage, identification of minerals of interest will be done.

Synthesis of all available data	i) Integration of Regional Geological, Structural Geology, Lithology, Petrographical data and bore holes data will be done. Geological Map and Sections will be prepared and Resources/Reserves will be calculated. Thereafter Synthesis of all available data and Report writing will be done.

Borehole spacing (As per MEMC, 2015)

Type of deposit	Bedded, Stratiform and Tabular Deposits of Regular habit (Minerals to be identified)	Bedded, Stratiform and Tabular deposits of Irregular habit (Minerals to be identified)	Lenticular bodies occurringechelon Lenses, Pockets. (Different Minerals)
G3 Stage	800 m to 400 m	400 m or closer	Borehole spacing along strikemay be kept 200-100 m or closer interval
G2 Stage	200 m or closer	200 m to 100 m or closer	Borehole spacing along strike may be kept 100-50 m orcloser

As per Minerals (Evidence of Mineral Contents) rules 2015 the present Limestone Block is coming under **Category I- i.e. Bedded, Stratiform and Tabular Deposits of Regular.** If Limestone is continued at depth than depth of bore hole will be increased till bottom of Limestone is encountered.

INDRANEEL DAWANDE

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Date: 2024.11.09 18:13:32 +05'30'

Place: Jabalpur

Date: 9th November 2024

Signature of Applicant